

Attorney Docket No. 249437US2SRDDIV
Inventor: Takeshi UENO et al
Preliminary Amendment filed: March 2, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-4 (canceled)

Claim 5 (original): A balanced amplifier comprising:

a first voltage-to-current converter and a second voltage-to-current converter, each of the first voltage-to-current converter and the second voltage-to-current converter including

a first input terminal,

a second input terminal,

a first current source which outputs a first current,

a second current source which outputs a second current,

a first output terminal outputting a third current and

a second output terminal outputting a fourth current,

wherein the third current is obtained by subtracting a sum current from the first current, the sum current corresponding to sum of currents corresponding to voltages applied to the first input terminal and the second input terminal respectively, and the fourth current being obtained by subtracting the sum current from the second current, and

wherein the second input terminal and second output terminal of the first voltage-to-current converter and the second input terminal and second output terminal of the second voltage-to-current converter is connected in common, a differential input signal is input to the first input terminals of the first voltage-to-current converter and the second voltage-current converter, and a differential output signal is output from the first output terminal of the first voltage-to-current converter and the second voltage-current converter.

Claim 6 (original): The balanced amplifier according to claim 5, which includes a first impedance element connected in parallel to the first voltage-to-current converter between the first input terminal and the first output terminal of the first voltage-to-current converter, and a second impedance element connected in parallel to the second voltage-to-current converter between the first input terminal and the first output terminal of the second voltage-to-current converter.

Claim 7 (original): The balanced amplifier according to claim 6, which includes a plurality of impedance elements each supplied with the differential input signal, wherein at least one of the plurality of impedance elements is connected to the first input terminal of each of the converters.

Claim 8 (original): The balanced amplifier according to claim 6, which includes a plurality of single input/single output voltage-to-current converters to which the differential input signal is supplied, and wherein at least one of the plurality of the single input/single output voltage-to-current converters is connected to the first input terminal of each of the converters.

Claim 9 (original): A filter comprising the balanced amplifier according to claim 6.

Claim 10 (original): The balanced amplifier according to claim 5, which further comprises a third voltage-to-current converter having a configuration equal to that of the first voltage-to-current converter and the second voltage-to-current converter, and wherein a first input terminal and an output terminal of the third voltage-to-current converter are connected

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to the first input terminal of the first voltage-to-current converter, and a second input terminal and a second output terminal of the third voltage-to-current converter are connected to the first input terminal of the second voltage-to-current converter.

Claim 11 (original): The balanced amplifier according to claim 10, wherein each of the first voltage-to-current converter, the second voltage-to-current converter, and the third voltage-to-current converter comprise a third input terminal and a fourth input terminal, and the first current source and the second current source supply a sum current corresponding to sum of the currents corresponding to voltages applied to the third input terminal and the fourth input terminal to the first output terminal and the second output terminal of each of the first voltage-to-current converter and the second voltage-to-current converter.

Claim 12 (original): The balanced amplifier according to claim 10, wherein each of the first voltage-to-current converter, the second voltage-to-current converter and the second voltage-to-current converter includes a first power line and a second power line, and two transistors connected in series between the first power line and the second power line.

Claim 13 (original): A filter comprising the balanced amplifier according to claim 10.

Claim 14 (original): The balanced amplifier according to claim 5, wherein each of the first voltage-to-current converter and the second voltage-to-current converter comprise a third input terminal and a fourth input terminal, and the first current source and the second current source supply a sum current corresponding to sum of the currents corresponding to

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voltages applied to the third input terminal and the fourth input terminal to the first output terminal and the second output terminal of each of the first voltage-to-current converter and the second voltage-to-current converter.

Claim 15 (original): The balanced amplifier according to claim 5, wherein each of the first voltage-to-current converter and the second voltage-to-current converter includes a first power line and a second power line, and two transistors connected in series between the first power line and the second power line.

Claim 16 (original): A balanced amplifier comprising:
a first voltage-to-current converter and a second voltage-to-current converter, each of the first voltage-to-current converter and the second voltage-to-current converter including:
a first input terminal,
a second input terminal,
a first output terminal and
a second output terminal, and
each of the first voltage-to-current converter and the second voltage-to-current converter supplying a current corresponding to sum of currents corresponding to voltages applied to the first input terminal and the second input terminal respectively to the first output terminal and the second output terminal so that a polarity of an output signal from the first output terminal is reversed with respect to a polarity of an input signal to the first input terminal, and a polarity of an output signal from the second output terminal is reversed with respect to a polarity of an input signal to the second input terminal,
wherein the second input terminals and second output terminals of the converters is

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connected in common, a differential input signal is input to the first input terminals of the converters, and a differential output signal is output from the first output terminals of the converters.

Claim 17 (original): The balanced amplifier according to claim 16, wherein each of the first voltage-to-current converter and the second voltage-to-current converter further includes a third input terminal and a fourth input terminal, and supplies to the first output terminal and the second output terminal a sum current corresponding to sum of currents corresponding to input voltages applied to the third input terminal and the fourth input terminal so that polarities of output signals from the first output terminal and the second output terminal coincide with polarities of input signals to the third input terminal and the fourth input terminal.

Claims 18-22 (canceled).